

WE CLAIM:

1. A computer readable medium having stored therein a set of routines for implementing a medium-access-control-layer protocol, said protocol for contention resolution and capable of distinguishing among a plurality of priority classes for a plurality of stations connected to a computer network, said set of routines implementing said protocol including a set of intervals and signals comprising:

a dead-time-silence-interval, used to begin an open-contention-interval;

an open-contention-interval, used to allow the plurality of stations to contend to gain control of a physical layer below the medium access control layer;

an intent-to-transmit-signal, comprising a single signal frequency selected at random from a set of signal frequencies available on the physical layer;

a combined-contention-signal, comprising a superposition of a plurality of intent-to-transmit-signal frequencies and is used to resolve contentions;

a restricted-contention-interval for use only for stations colliding in a previous contention-interval; and

a restricted-contention-delay-interval, used to begin the restricted-contention-interval, and is shorter than the dead-time-silence-interval.

2. The computer readable medium of claim 1, wherein the set of signal frequencies available on the physical layer is partitioned into a plurality of contiguous frequency ranges and

a class priority is associated with the plurality of partitions, and the partitions are used to provide a plurality of priority classes for the plurality of stations contending to gain control of the physical layer below the medium access control layer.

3. In a network system with a plurality of stations, the plurality of stations having a medium access control layer above a physical layer, a method of resolving contention with a medium-access-control-layer protocol for connecting the plurality of stations to a transmission medium, the method comprising the following steps:

broadcasting a first signal from stations in the network system with a medium-access-control-layer protocol during a predefined medium access control protocol contention interval, wherein the first signal is a single frequency selected at random from a predetermined set of frequencies used by the physical layer in the network system;

receiving a second signal on the stations in the network system with the medium access control protocol, wherein the second signal is a superposition of a plurality of first signals from stations in the network system;

decoding a plurality of first signal frequencies in the second signal;

determining from the plurality of stations a first station to transmit data based on the decoded frequencies in the second signal; and

allowing the first station to transmit data on the transmission medium without interference from any of the other stations.

4. A computer readable medium having stored therein instructions for causing a central processing unit on a station to execute the method of claim 3.

5 5. The method of claim 3 further comprising:
determining from the second signal whether two or more stations have broadcast the same frequency, and if so,
repeating the broadcasting, receiving, decoding and determining steps until one station can be selected based on the decoded frequencies in the second signal.

10 6. The method of claim 3 wherein the determining step includes determining a station with the highest frequency in the second signal.

15 7. The method of claim 3 wherein the first signal is a medium-access-control-layer protocol intent-to-transmit-signal and the second signal is a medium-access-control-layer protocol combined-contention-signal.

20 8. The method of claim 3 wherein the second signal includes a plurality of signal frequency partitions allowing a plurality of priority classes to be used to select a station to transmit data to the transmission medium.

9. The method of claim 3 wherein the decoding step includes using Fast Fourier Transformations to decode the plurality of frequencies in the second signal.

25 10. In a network system with a plurality of stations, the plurality of stations having a medium access control layer above a physical layer, a method of resolving contention with a medium-access-control-layer protocol for connecting the stations to a transmission medium, the method comprising the following steps:

30 selecting randomly on a first station a signal frequency to send during a medium-access-control-layer protocol open-contention-interval;

broadcasting the randomly selected signal frequency in an intent-to-transmit-signal with a medium-access-control-layer protocol from the first station to other stations on the network during the medium access control protocol open-contention-interval;

receiving on the first station with the medium access control protocol a combined-contention-signal, wherein the combined control signal is a superposition of a plurality of intent-to-transmit-signals from others stations in the network system;

decoding a plurality of intent-to-transmit-signal frequencies from the combined-contention-signal;

40 determining whether the first station randomly selected the highest intent-to-transmit-signal frequency in the combined-contention-signal, and if so,

transmitting data from the first station to the transmission medium.

11. A computer readable medium having stored therein instructions for a causing a central processing unit on a station to execute the method of claim 10.

12. The method of claim 10 further comprising:

determining whether the first station randomly selected the highest intent-to-transmit-signal frequency in the combined-contention-signal, and if not,

waiting for a next medium access control protocol open-contention-interval before sending another randomly selected signal during the next medium-access-control-layer protocol open-contention-interval.

13. The method of claim 10 further comprising:

determining whether the first station detects a collision on the transmission medium, and if so,

halting transmission of data from the first station;

determining that two or more stations have caused the collision, wherein the two or more stations had broadcast the same highest signal frequency in an intent-to-transmit-signal;

creating a medium-access-control-layer protocol restricted-contention-interval including only those stations determined to have caused the collision;

waiting for a medium-access-control-layer protocol restricted contention delay time period;

repeating the selecting, broadcasting, receiving, and decoding steps with the restricted-contention-interval until a single station randomly selects a highest signal frequency to resolve the contention; and

allowing the single station to transmit data to the transmission medium.

14. The method of claim 10 wherein the combined-contention-signal includes a plurality of signal frequency partitions allowing a plurality of priority classes to be used to select a station to transmit data to the transmission medium.

15. The method of claim 10 wherein the decoding step includes using Fast Fourier Transformations to decode frequencies the combined-contention-signal.

16. In a network system with a plurality of stations, the plurality of stations having a medium access control layer above a physical layer, a method of providing multiple priority classes with a medium-access-control-layer protocol connecting the stations to a transmission medium, the method comprising the following steps:

selecting N-number of priority classes to be used for contending stations;

partitioning a set of frequencies available for the physical layer into N-number of partitions, wherein each partition includes a contiguous range of frequencies from the set of frequencies and represents a priority class;

making the N-number of partitions available to stations contending to transmit data over the transmission medium,

wherein signals from N-number of available partitions are randomly selected for use in a medium-access-control-layer protocol signal broadcast during a medium-access-control-layer protocol open-contention-interval.

17. A computer readable medium having stored therein instructions for a causing a central processing unit on a station to execute the method of claim 16.

18. The method of claim 16 wherein the medium-access-control-layer protocol signal is an intent-to-broadcast signal.

19. In a network system with a plurality of stations, the plurality of stations having a medium access control layer above a physical layer, a method of using multiple priority classes with a medium-access-control-layer protocol connecting the stations to a transmission medium, the method comprising the following steps:

decoding from first signal received on a first station, a set of Y-number of frequencies from a set of frequencies available for a physical layer partitioned into N-number of partitions, wherein each partition includes a contiguous range of frequencies from the set of frequencies and represents a priority class; and

determining whether the first station randomly selected the highest signal frequency in the set of Y-number of frequencies from the decoded first signal, and if so,

transmitting data from the first station to the transmission medium.

20. A computer readable medium having stored therein instructions for a causing a central processing unit on a station to execute the method of claim 19.

21. The method of claim 19 further comprising:

determining whether the first station randomly selected the highest signal frequency in from the set of Y-number of frequencies decoded first signal, and if not,

waiting for a next medium access control protocol open-contention-interval before randomly selecting another signal frequency from one of the N-number of partitions.

22. The method of claim 19 wherein the first signal is a medium-access-control-layer protocol combined-contention-signal.

23. A system for resolving contention with a medium-access-control-layer protocol in a medium access control layer in a computer network, the system comprising:

medium-access-control-layer protocol with a plurality of signals, for contention resolution and capable of distinguishing among a plurality of priority classes for a plurality of stations connected to the computer network;

set of frequency signals for a physical layer used below the medium access control layer, wherein the set of frequency signals allows a plurality of priority classes to be determined with the medium-access-control-layer protocol;

contention signal decoder, for determining whether or not a station in the computer network has broadcast a highest frequency signal in a medium-access-control-layer protocol signal; and

collision detector, for determining whether or not a station transmitting data in the computer network is colliding with another station transmitting data in the network after being selected to transmit data with the medium-access-control-layer protocol.

24. The system of claim 23 wherein the medium-access-control-layer protocol includes a dead-time-silence-interval, an open-contention-interval, an intent-to-transmit-signal, a combined-contention-signal, a restricted-contention-interval, and a restricted-contention-delay-interval.

25. The system of claim 24 wherein the medium-access-control-layer protocol intent-to-transmit-signal includes a randomly selected signal frequency from a set of signal frequencies used for a physical layer below the medium access control layer and the medium-access-control-layer protocol combined-contention-signal is superposition of a plurality of medium-access-control-layer protocol intent-to-transmit-signals from a plurality of stations in the computer network.

26. The system of claim 23 wherein the contention signal decoder determines whether or not a station in the computer network has broadcast a highest frequency signal in a medium-access-control-layer protocol signal wherein the signal is a medium access control level protocol combined-contention-signal that is a superposition of a plurality of medium-access-control-layer protocol intent-to-transmit-signals from a plurality of stations in the computer network.

Fast Fourier Transform engine, for converting a time domain signal into a frequency domain signal;

inverse Fast Fourier Transform engine, for converting a frequency domain signal into a time domain signal; and

physical layer process manager, for maintaining a physical layer below the medium access control layer.

Add 2

[illegible]